

In re Application of: Kowalchik et al.
Attorney Docket No.: EMR-00401

REMARKS

This Response is filed in reply to the Office Action dated March 12, 2004.

In this Response, Applicants amend claims 1, 14, 23, 32, and 38 to more explicitly state the claimed features. Additionally, Applicants cancel, without prejudice, claims 24, 26-29, 31, and 33, and add new claims 39-42, and traverse the Examiner's rejection of claims 1-38. Amendments to the claims are not an acquiescence to any of the rejections. Further, silence with regard to any of the Examiner's rejections is not an acquiescence to such rejections. Specifically, silence with regard to Examiner's rejection of a dependent claim, when such claim depends from an independent claim that Applicants consider allowable for reasons provided herein, is not an acquiescence to such rejection of the dependent claim(s), but rather a recognition by Applicants that such previously lodged rejection is moot based on Applicants' remarks and/or amendments relative to the independent claim (that Applicants consider allowable) from which the dependent claim(s) depends. Upon entry of the amendment, claims 1-23, 25, 30, 32, 34-42 are pending in the present application.

The issues of the Office Action are presented below with reference to the Office Action.

With regard to the paragraphs entitled "Double Patenting:"

The Examiner provisionally rejected claims 4, 5, and 23 based on nonstatutory double patenting over claims 1, 4, and 20, respectively of co-pending Application No. 10/004,090. Applicants delay the issue of filing a terminal disclaimer in compliance with 37 C.F.R. §1.321(c) until the other claim rejections are removed.

With regard to the paragraphs entitled "Claim Objections:"

The Examiner objected to claim 24, 27, 29, and 33. As provided herein, in the interest of expediting prosecution of the above-identified application, Applicants cancel, without prejudice, claims 24, 27, 29, and 33.

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With regard to the paragraphs entitled "Claim Rejections - 35 U.S.C. §102:"

Examiner rejected claims 1-38 under 35 U.S.C. §102(b) as being anticipated by Brant et al. (U.S. Patent No. 5,805,787).

As Examiner knows, and as provided in MPEP 2131, "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference" [emphasis added] (*Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053).

As provided herein, Applicants amend independent claim 1 to add the feature previously described in canceled claim 26 that the cache manager stores identification data identifying addresses within the cache storage where data is stored and the corresponding addresses at the back-end storage area where that data is stored, and add the further feature that such storage of identification data is performed in response to detecting a power failure,. Applicants similarly amend independent claims 14 and 23. Support for these amendments may be found in page 9, lines 10-17 of the originally filed application.

Applicants' amended independent claim 1 thus discloses a cache comprising a front-end interface that receives data access requests that specify respective data storage addresses, a back-end interface that can retrieve data identified by the data storage addresses, a cache formed by at least two disks, a cache manager that services at least some of the requests received at the front-end interface using data stored in the cache storage, *where the cache manager stores, in response to detecting a power failure, identification data identifying addresses within the cache storage where data is stored and the corresponding addresses at a back-end storage area where the data is stored.* As disclosed in new claim 39, the identification data can correspond to cache locations of deferred writes.

Brant, in contrast to Applicants' independent claim 1, does not disclose a cache manager that *stores, in response to detecting a power failure, identification data identifying addresses within the cache storage where data is stored and the corresponding addresses at a back-end storage area where the data is stored.* Although Brant may use address identification data in

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implementing various cache storage strategies, such as, for example, direct mapping strategy, Brant does not disclose storing identification data in response to detecting a power failure. Rather, as acknowledged by the Examiner, the inherent use of address identification data described in Brant includes "a certain number of bits describing the address of the main store and a certain number of bits describing the location in the cache" (page 15 of the March 12, 2004 Office Action, lines 17-19). This type of address identification data is stored to facilitate ongoing operation of the cache storage strategy Brant implements, and, in contrast to Applicants' independent claim 1, is not stored for uses other than implementing cache storage strategies, and/or in response to detecting a power failure. Accordingly, unlike Applicants' independent claim 1, Brant *does not teach* that the cache manager stores, in response to detecting a power failure, identification data identifying addresses within the cache storage where data is stored and the corresponding addresses at a back-end storage area where the data is stored.

Since Brant does not teach Applicants' independent claim 1 feature of a cache manager that stores, in response to detecting a power failure, identification data identifying addresses within the cache storage where data is stored and the corresponding addresses at a back-end storage area where the data is stored, Applicants traverse the Examiner's 35 U.S.C. §102(b) rejection of independent claim 1, and thus consider independent claim 1 to be allowable. Claims 2-13, and 25 are also allowable as depending from an allowable base claim.

Amended independent claim 14 includes a feature that *servicing further comprises storing, in response to detecting a power failure, identification data identifying addresses of data stored within said cache storage and the corresponding addresses at a back-end storage area where the data is stored*. As provided with respect to allowable independent claim 1, Brant does not teach servicing that comprises storing, in response to detecting a power failure, identification data identifying addresses of data stored within said cache storage and the corresponding addresses at a back-end storage area where the data is stored. Similarly, amended independent claim 23 discloses a cache manager that stores, in response to detecting a power failure, identification data identifying addresses of data stored within said cache storage and the corresponding addresses at said back-end storage area where the data is stored, which, as provided herein, is not taught by Brant. Accordingly, Applicants traverse Examiner's rejection

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of independent claims 14 and 23 and consider independent claims 14 and 23 to be allowable for the same reasons provided with regard to allowable independent claim 1.

Since claims 15-22 depend from allowable independent claim 14, claims 15-22 are also allowable as depending from an allowable claim base. Applicants thus traverse Examiner's rejection of claims 15-22. Furthermore, since claim 30 depends from allowable independent claim 23, claim 30 is also allowable as depending from an allowable claim base. Applicants thus traverse Examiner's rejection of claim 30.

Applicants also amend claim 32 to add the feature that the cache storage of each of the plurality of caches of the data storage system described therein has a respective cache storage address space, and further add the feature that at least some of the I/O requests serviced correspond to addresses in the respective cache storage address space of at least some of the plurality of caches comprising the data storage system of claim 32. Support for these amendments may be found in page 10, lines 17-22, of the originally filed application.

As provided herein, Applicants' amended claim 32 discloses a data storage system, comprising a back-end storage system having a back-end address space, addresses in the address space identifying blocks of storage. The data storage system further comprises a plurality of caches for the back-end storage system, each of the plurality of caches having a lesser storage capacity than the back-end storage system, each of the plurality of caches including a front-end interface that receives I/O (Input/Output) requests that specify respective addresses of back-end storage blocks, a back-end interface capable of communicating with one of back-end storage system and another of one of the plurality of caches, cache storage formed by at least two disks, *the cache storage having a respective cache storage address space*, and a cache manager that services at least some of the I/O requests received via the front-end interface using blocks temporarily stored in the data storage system, *the at least some of the I/O requests corresponding to addresses in the respective cache storage address space of at least some of the plurality of caches*.

Although, as Examiner explained on page 16 of the Office Action, Brant discloses that a plurality of caches may be used (col. 5, lines 29-31), Brant does not disclose that the cache storage of each such cache used has a *respective cache storage address space*, nor does Brant

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disclose that at least some of the I/O requests serviced by the respective cache managers of the plurality of caches *correspond to addresses in the respective cache storage address space of the plurality of caches*. Rather, Brant contemplates increasing the cache capacity of a system by using several inexpensive cache storage devices together, but does not disclose using one of those cache storage devices to store data located in addresses corresponding to the address space of another cache storage device.

Accordingly, since Brant does not disclose that each cache storage of a plurality of caches has a *respective cache storage address space*, nor does Brant disclose that at least some of the I/O requests serviced by the respective cache managers of the plurality of caches *correspond to addresses in the respective cache storage address space of the plurality of caches*, Applicants traverse the Examiner's 35 U.S.C. §102(b) rejection of independent claim 32, and thus consider independent claim 32 to be allowable. Claims 34-38 are also allowable as depending from an allowable base claim.

New Claims 39-42

New claims 39-42 depend from one of allowable independent claims 1, 14, 23, or 32, and hence, are also allowable.

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CONCLUSION

In view of the foregoing remarks, Applicants submits that the response herein is fully responsive to the subject Office Action, and that the pending claims are patentable over the cited prior art. Accordingly, Applicants submit that the claims are now in condition for allowance. Withdrawal of the pending rejections, and favorable reconsideration are respectfully solicited. If there are any remaining issues or the Examiner believes that a telephone conversation with Applicants' attorney would be helpful in expediting the prosecution of this application, the Examiner is invited to call the undersigned at 617-832-1241.

Date:

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